

## WHAT IS CLAIMED IS:

1. A semiconductor laser device comprising:  
an optical fiber having an optical fiber grating;  
5 a semiconductor laser having an active layer with a single quantum well, for emitting laser light; and  
a coupling optical system for coupling the laser light emitted out of the semiconductor laser into the optical fiber.
- 10 2. The semiconductor laser device according to Claim 1, wherein the coupling optical system includes a narrow-band filter for adjusting an incident angle of the laser light emitted out of the semiconductor laser.
- 15 3. The semiconductor laser device according to Claim 1, wherein the optical fiber grating has a reflection bandwidth wider than or substantially equal to a 3dB bandwidth of a gain of the semiconductor laser or a spectrum full width at half maximum of the laser light of the semiconductor laser.
- 20 4. The semiconductor laser device according to Claim 1, wherein the coupling optical system has a narrow-band filter for adjusting an incident angle of the laser light emitted out of the semiconductor laser, and wherein the optical fiber grating has a reflection bandwidth wider than or substantially equal to a 3dB bandwidth of a gain of the semiconductor laser or a spectrum full width at half maximum of the laser light of the semiconductor laser.
- 25 5. The semiconductor laser device according to Claim 2,

wherein the coupling optical system includes a collimator lens for collimating the laser light emitted out of the semiconductor laser and for outputting the collimated laser light to the narrow-band filter, and a condenser lens for 5 focusing the laser light output from the narrow-band filter onto the optical fiber.

6. The semiconductor laser device according to Claim 1, wherein the semiconductor laser has an anti-reflection coating 10 with a reflectivity of about 10 % or less, which is formed on an emitting exit face thereof from which the laser light is emitted.

7. The semiconductor laser device according to Claim 6, 15 wherein the anti-reflection coating has a reflectivity lower than that of the optical fiber grating.

8. The semiconductor laser device according to Claim 1, wherein the semiconductor laser includes a layer having a 20 refraction index lower than that of an optical guide layer disposed outside the active layer with the single quantum well, said layer having such a thickness as to prevent itself from becoming a barrier that keeps an electric current from flowing through the semiconductor laser and said layer being disposed 25 outside the optical guide layer.

9. The semiconductor laser device according to Claim 1, 30 wherein the active layer, a barrier layer, and a guide layer of the semiconductor laser are configured to have a distortion compensating structure.

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10. The semiconductor laser device according to Claim  
2, wherein the optical fiber grating has a reflection bandwidth  
of 5 nm or more.

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11. The semiconductor laser device according to Claim  
2, wherein the narrow-band filter includes an incident angle  
adjusting mechanism for adjusting the narrow-band filter so  
that the incident angle of the laser light incident on the  
10 narrow-band filter approaches 90 degrees with increasing  
ambient temperature.

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12. The semiconductor laser device according to Claim  
1, wherein the active layer with the single quantum well of  
15 the semiconductor laser has a thickness ranging from 10 nm to  
25 nm.

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13. A semiconductor laser device comprising:  
an optical fiber having an optical fiber grating;  
20 a semiconductor laser having an active layer with two  
or more quantum wells formed at intervals that are close enough  
to provide quantum coupling, for emitting laser light; and  
a coupling optical system for coupling the laser light  
emitted out of the semiconductor laser into the optical fiber.

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14. The semiconductor laser device according to Claim  
13, wherein the coupling optical system includes a narrow-  
band filter for adjusting an incident angle of the laser light  
emitted out of the semiconductor laser.

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15. The semiconductor laser device according to Claim  
13, wherein the optical fiber grating has a reflection  
bandwidth wider than or substantially equal to a 3dB bandwidth  
of a gain of the semiconductor laser or a spectrum full width  
5 at half maximum of the laser light of the semiconductor laser.

16. The semiconductor laser device according to Claim  
13, wherein the coupling optical system has a narrow-band  
filter for adjusting an incident angle of the laser light  
10 emitted out of the semiconductor laser, and wherein the optical  
fiber grating has a reflection bandwidth wider than or  
substantially equal to a 3dB bandwidth of a gain of the  
semiconductor laser or a spectrum full width at half maximum  
of the laser light of the semiconductor laser.

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17. The semiconductor laser device according to Claim  
14, wherein the coupling optical system includes a collimator  
lens for collimating the laser light emitted out of the  
semiconductor laser and for outputting the collimated laser  
20 light to the narrow-band filter, and a condenser lens for  
focusing the laser light output from the narrow-band filter  
onto the optical fiber.

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18. The semiconductor laser device according to Claim  
13, wherein the semiconductor laser has an anti-reflection  
coating with a reflectivity of about 10 % or less, which is  
formed on an emitting exit face thereof from which the laser  
light is emitted.

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19. The semiconductor laser device according to Claim

18, wherein the anti-reflection coating has a reflectivity lower than that of the optical fiber grating.

20. The semiconductor laser device according to Claim  
5 13, wherein the active layer, a barrier layer, and a guide layer of the semiconductor laser are configured to have a distortion compensating structure.

21. The semiconductor laser device according to Claim  
10 13, wherein the two or more quantum wells are formed at intervals of 8 nm or less.

22. The semiconductor laser device according to Claim  
15 14, wherein the optical fiber grating has a reflection bandwidth of 5 nm or more.

23. The semiconductor laser device according to Claim  
14, wherein the narrow-band filter includes an incident angle adjusting mechanism for adjusting the narrow-band filter so  
20 that the incident angle of the laser light incident on the narrow-band filter approaches 90 degrees with increasing ambient temperature.

24. An optical fiber amplifier comprising:

25 a semiconductor laser device including an optical fiber having an optical fiber grating, a semiconductor laser having an active layer with a single quantum well, for emitting pumping light, and a coupling optical system for coupling the pumping light emitted out of the semiconductor laser into the optical  
30 fiber;

a pumping light-signal light coupling means for coupling the pumping light emitted out of the semiconductor laser device to signal light; and

5 a rare-earth-doped optical fiber that is pumped by the pumping light so as to amplify the signal light output from the pumping light-signal light coupling means.

25. An optical fiber amplifier comprising:

a semiconductor laser device including an optical fiber  
10 having an optical fiber grating, a semiconductor laser having an active layer with two or more quantum wells formed at intervals that are close enough to provide quantum coupling, for emitting pumping light, and a coupling optical system for coupling the pumping light emitted out of the semiconductor  
15 laser into the optical fiber;

a pumping light-signal light coupling means for coupling the pumping light emitted out of the semiconductor laser device to signal light; and

20 a rare-earth-doped optical fiber that is pumped by the pumping light so as to amplify the signal light output from the pumping light-signal light coupling means.